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ICT AND INCLUSION IN PHYSICAL EDUCATION: PROMOTING THE SOCIAL INTEGRATION OF STUDENTS WITH PSYCHOSOCIAL BARRIERS IN PRIMARY EDUCATION

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Abstract:
The integration of Information and Communication Technologies (ICT) into education has emerged as a defining feature of modern pedagogy, a trend that accelerated markedly in the aftermath of the COVID-19 pandemic. While ICT adoption has created new opportunities for teaching and learning, it has also revealed persistent challenges, particularly regarding equitable access and participation. Physical Education (PE), as a cornerstone of students' holistic development, is no exception. Students with psychosocial barriers—such as anxiety, low self-esteem, social difficulties, and learning challenges—often face significant obstacles in engaging meaningfully in PE contexts. The forthcoming doctoral research, titled "ICT and Inclusion in Physical Education: Promoting the Social Integration of Students with Psychosocial Barriers in Primary Education", seeks to explore how modern ICT can be mobilized to enhance inclusion within PE. The study will adopt a multi-level perspective, examining the role of educational software, online and blended learning, and immersive technologies (virtual and augmented reality) in creating adaptive, supportive, and socially interactive learning environments. A mixed-methods design will guide the empirical investigation, with quantitative data capturing PE teachers' technology readiness and perceptions, and qualitative insights documenting the lived experiences of teachers and students. This research aspires to make both theoretical and practical contributions. Theoretically, it will extend current understandings of ICT as a vehicle for social inclusion in PE. Practically, it will inform the development of ICT-based pedagogical frameworks that serve as structural "bridges" to participation, motor skill acquisition, and social integration. By doing so, the project aims to provide evidence-based strategies that strengthen inclusivity and equity in primary education.

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1. Introduction

Inclusion in education is a cornerstone of contemporary educational theory and practice, reflecting society's commitment to equity, diversity, and social justice. It involves the intentional restructuring of learning environments, pedagogical methods, and curricula to optimize educational opportunities for all students, regardless of their physical, cognitive, emotional, social, or psychological characteristics. Inclusion extends beyond the mere physical placement of students with disabilities in general education settings; it constitutes a continuous and comprehensive process of meaningful integration (Beacham & McIntosh, 2013; Astuti & Sudrajat, 2020; Pijanowski & Brady, 2020). Social justice in education must align with the principles of democracy, equity, and respect for diversity, emphasizing that educational systems not only accommodate various educational needs but also actively promote a sense of belonging for marginalized students (Astuti & Sudrajat, 2020; Roohi, 2022).

Within this framework, Physical Education (PE) plays a distinctive and essential role. It supports not only children's physical health but also the development of interpersonal competencies such as teamwork, cooperation, and emotional regulation (Lieberman *et al.*, 2018; Bassey, 2016). Through structured movement, games, and physical activities, PE provides opportunities for experiential learning and social bonding, especially for primary school children at a formative stage of personal and social development (Klizas *et al.*, 2012). This environment encourages self-confidence and collaborative engagement (Crawford *et al.*, 2022). Furthermore, inclusive PE practices bridge gaps for students with disabilities, fostering environments where children can develop socially, emotionally, and physically (Penney *et al.*, 2017; Lieberman *et al.*, 2018; Abdullah & Chaudhry, 2018).

However, students experiencing psychosocial barriers may find PE to be challenging and potentially alienating. Such barriers can include anxiety, low self-esteem, social withdrawal, bullying, and emotional dysregulation (Dilworth *et al.*, 2014; Shen *et al.*, 2024; Hossain *et al.*, 2020). These conditions may undermine students' motivation to participate in physical activities, hinder peer relationships, and diminish overall engagement with teachers (Pherali, 2021). Consequently, many of these students are at heightened risk of marginalization in PE contexts, which exacerbates feelings of social alienation and adversely affects their educational participation (Nanninga *et al.*, 2015; Salili, 2020). Addressing these issues requires comprehensive strategies that foster inclusive environments where all students feel supported and empowered to thrive both physically and socially (Zubrickienė & Anužienė, 2022).

The COVID-19 pandemic profoundly disrupted established educational models and catalyzed a reevaluation of pedagogical practices. The rapid transition to online and hybrid learning underscored the importance of flexible, inclusive, and technology-

enabled approaches. Once considered supplementary, ICT has emerged as a critical tool for sustaining learning continuity and delivering differentiated instruction. These developments revealed ICT's capacity to foster participation, engagement, and personalized learning experiences, particularly for students unable to attend classes in person (Beacham & McIntosh, 2013; Malak, 2013).

Although the integration of ICT in education has been extensively studied, relatively little empirical research has examined its specific role in fostering inclusion within PE, particularly in primary and secondary school contexts (Moti *et al.*, 2018; Adams *et al.*, 2024). Given PE's reliance on direct interaction and physical presence, its digital transformation presents distinctive challenges and opportunities. Understanding how ICT can facilitate the inclusion of students with psychosocial difficulties thus emerges as a critical field of inquiry (Hoffmann *et al.*, 2014).

This study seeks to address this gap by systematically investigating the role of ICT as a transformative force in PE, with a particular focus on the social inclusion and active participation of students with psychosocial barriers in primary schools. Employing a multi-tiered approach that combines empirical analysis with pedagogical reflection, the study aims to answer the following research questions:

1) To what extent are ICT tools employed in PE to support inclusive pedagogy?
2) How do primary PE teachers perceive, experience, and respond to ICT in promoting inclusion for students with psychosocial challenges?
3) What impact do targeted ICT interventions have on students' psychomotor motivation, participation, skill development, and social integration in PE settings?

By addressing these questions, this research contributes both theoretically and practically to the discourse on inclusion. It offers empirical evidence on the transformative capacity of ICT in PE while providing actionable insights for teachers, curriculum developers, and policymakers. Ultimately, it aims to strengthen the positioning of PE as a field that embraces inclusivity, adaptability, and student-centered learning in the 21st century.

2. Literature Review

2.1 ICT in Education

Information and Communication Technologies (ICT) have become a cornerstone of modern educational practice, exerting profound influence on student engagement, personalized learning, and educational equity. Drawing upon constructivist and social learning theories, the integration of ICT supports active, experiential, and collaborative learning—approaches shown to be more effective than traditional pedagogical strategies in fostering deep and enduring knowledge acquisition (Zubković *et al.*, 2022; Kumar, 2023; Kottara *et al.*, 2024; Choustoulakis *et al.*, 2025).

A growing body of empirical research underscores the transformative potential of ICT in enhancing students' academic performance. Studies indicate that the use of ICT tools positively influences learners' motivation, self-efficacy, and overall achievement,

particularly in primary education (Ogunjobi *et al.*, 2023; Basri *et al.*, 2018; Youssef *et al.*, 2022; Aworanti, 2016). The increasing prevalence of interactive whiteboards, tablets, gamified applications, and learning management systems reflects a broader shift toward digitalized classrooms, enabling greater individual engagement and personalized instruction.

The relationship between ICT access and educational success has been widely documented. Students with greater access to technological tools generally demonstrate improved learning outcomes, which highlights the importance of ensuring equitable distribution of digital resources (Ogunjobi *et al.*, 2023; Kumar & Mohapatra, 2021). However, the effectiveness of ICT integration is heavily dependent on teacher readiness. For this reason, contemporary education systems must remain flexible and prioritize systematic professional development. Timely training in digital pedagogy is essential to equip teachers with the competencies necessary for effective ICT use in diverse classroom contexts (Aslan & Zhu, 2016; Mlambo *et al.*, 2020).

2.2 Psychosocial Barriers in Physical Education

Physical Education (PE) plays a vital role in the holistic development of students, contributing to physical health, emotional stability, social competence, and overall well-being. However, students who face psychosocial barriers - such as anxiety, low self-esteem, social withdrawal, and fear of negative evaluation - often struggle to participate fully in PE contexts (Kunwar, 2020). These limitations can lead to marginalization, reduced engagement, and the loss of valuable developmental opportunities.

Research suggests that personalized and adaptive instruction can help address these challenges. For instance, Adeloye *et al.* (2023) highlight that tailoring PE instruction to students' emotional and social needs enhances inclusivity and diversity within learning environments. Creating inclusive PE, however, requires more than curricular adjustments; it necessitates a supportive atmosphere characterized by safety, empathy, and acceptance. Unfortunately, many traditional PE structures lack the flexibility and resources to provide individualized learning opportunities or sufficient emotional support (Wong & Daud, 2018).

Psychosocial barriers in PE thus represent a significant equity issue in education. Students experiencing these challenges are more likely to be socially excluded, which intensifies their vulnerability and further restricts their participation. To counter this, PE programs must adopt differentiated, learner-centered approaches. Among the most promising strategies is the integration of ICT, which has the potential to transform traditional PE practices and promote equitable participation by enabling adaptive, inclusive, and student-responsive learning models (Youssef *et al.*, 2022; Goldhaber, 2021).

2.3 ICT and Inclusion in Physical Education

The intersection of ICT and inclusive educational practices within PE has gained increasing attention in recent years. Digital tools such as virtual and augmented reality (VR/AR) provide innovative opportunities to replicate real-world sporting environments

in safe, controlled virtual spaces. These applications are particularly beneficial for students with social anxiety, as they allow participation at an individualized pace without the pressure of public performance.

Motion-based gaming technologies, such as Nintendo Wii and Microsoft Kinect, also demonstrate strong potential for inclusion. By integrating physical exertion with gamified tasks, these platforms create alternative avenues of participation for students who may otherwise face difficulties engaging in competitive sports or public displays of physical ability. Similarly, asynchronous online platforms enable individualized movement tasks and reflective practices, fostering emotional safety and supporting the development of self-regulation skills.

Despite these promising applications, empirical research on the strategic use of ICT for inclusion in primary-level PE remains limited. Existing studies tend to focus on either general classroom contexts or secondary education, leaving a gap in understanding how ICT can specifically enhance inclusive practices in primary PE. Moreover, little is known about teachers' readiness to adopt ICT, their attitudes toward integration, and their perceptions of students' psychosocial challenges in this setting. This gap highlights the need for systematic research into how digital tools can be employed to design inclusive, adaptable PE opportunities that strengthen social integration. Poulitsa, Choustoulakis, and Travlos (2025) sought to address this gap by introducing a conceptual framework and designing a mixed-methods research approach that incorporated a quantitative assessment of the emotional well-being of primary school students with psychosocial barriers. Building on this line of research, the present study aims to highlight how significant both the technology readiness of PE teachers and the effectiveness of ICT-based interventions are in enhancing participation and improving psychosocial outcomes among these students.

3. Methodology

3.1 Research Design

The forthcoming research will employ a mixed-methods design, integrating quantitative and qualitative approaches to investigate the role of Information and Communication Technologies (ICT) in fostering inclusion within Physical Education (PE) for primary school students facing psychosocial barriers. The complexity of this research focus necessitates such a design: while quantitative data will capture broader patterns and associations, qualitative insights will allow for an in-depth exploration of subjective experiences and contextual realities. As emphasized in prior methodological scholarship, mixed-methods approaches are particularly well suited to educational research addressing attitudes, teaching practices, and institutional dynamics.

The study will unfold in three sequential and interconnected phases.

- Phase One will consist of a large-scale quantitative survey of PE teachers, documenting their ICT use, perceptions of inclusion, and professional readiness.

- Phase Two will involve qualitative case studies through interviews, classroom observations, and document analysis to uncover the lived experiences of teachers and students in inclusive PE environments.
- Phase Three will focus on the co-design, implementation, and evaluation of an innovative ICT-supported PE intervention in selected schools.

This iterative structure ensures cumulative knowledge-building, with findings from earlier phases informing subsequent stages. In this way, the study will gradually evolve, producing both statistically grounded and contextually rich insights.

3.2 Participants

The research will involve educators, students, and parents. Participants will include primary school PE teachers drawn from diverse educational contexts—urban, suburban, and rural—ensuring a broad representation of practices and digital infrastructures. Teachers will contribute data regarding their ICT practices and perceptions of its inclusive potential.

Students aged 9–12 years, identified by school staff as experiencing psychosocial challenges (e.g., anxiety, low self-esteem, fear of judgment, or social withdrawal), will be included in the qualitative phases. Their perspectives will provide essential evidence on how ICT influences motivation, engagement, and participation. Parents and guardians will also be consulted to contextualize students' experiences beyond the classroom and strengthen ethical safeguards.

A purposive sampling strategy will be adopted to capture diverse contexts and experiences. Approximately 150 PE teachers will be surveyed during the quantitative phase. Based on these findings, four to six qualitative case studies will be conducted in ICT-integrated, inclusive PE classrooms. This balanced design will ensure both breadth and depth in understanding.

3.3 Data Collection and Instrumentation

A structured questionnaire will be administered to PE teachers, capturing demographic variables (e.g., years of experience, school type, ICT training), the frequency and type of ICT use in PE, perceived barriers, and beliefs about the impact of ICT on participation and emotional engagement. Items will be measured on a five-point Likert scale, adapted from validated instruments (Aslan & Zhu, 2016; Ogunjobi *et al.*, 2023). A pilot test will precede the main survey to ensure validity and reliability.

For the qualitative phase, semi-structured interviews with PE teachers will explore the benefits and challenges of ICT in addressing psychosocial barriers. Classroom observations will provide contextualized evidence of tool use and student interactions, focusing on engagement, participation, and emotional responses. Students' reflections (via journals or voice recordings) and parent interviews will enrich the dataset. All data will be collected with informed consent, securely stored, and anonymized to uphold confidentiality.

3.4 Intervention Phase

The intervention phase will involve the co-design of an ICT-based program with selected PE teachers to ensure contextual alignment. It will combine digital tools such as gamified movement platforms (e.g., Nintendo Wii, Just Dance), video demonstrations to reduce performance anxiety, and immersive VR/AR environments to create safe, inclusive sporting contexts. Educational applications supporting self-directed learning, goal setting, and feedback will also be integrated.

The intervention will run over six to eight weeks in participating classrooms. Its effectiveness will be evaluated through pre- and post-intervention surveys on student engagement, self-efficacy, and emotional well-being, complemented by post-intervention interviews and classroom observations.

3.5 Data Analysis

Quantitative data will be analyzed using descriptive and inferential statistics, including t-tests, ANOVA, and regression models, to examine relationships between ICT practices and inclusion-related outcomes.

Qualitative data will undergo thematic analysis (Braun & Clarke, 2006), using inductive coding to identify recurring patterns and emerging themes across interviews, observations, and student reflections. Data triangulation across multiple sources will enhance validity and credibility, ensuring robust findings.

3.6 Ethical Considerations

The study will be conducted in full compliance with established ethical standards for research involving human participants. Ethical approval will be obtained from the relevant university ethics committee prior to data collection.

All adult participants will provide informed consent, while student participants will give assent with the additional consent of their parents or guardians. Confidentiality will be safeguarded through the anonymization of all data, and participation will remain entirely voluntary, with the right to withdraw at any stage without penalty.

Data will be securely stored on encrypted servers, accessible only to the research team, and will be used exclusively for academic purposes in accordance with current data protection regulations. These measures are intended to ensure the integrity of the research process while protecting the rights and well-being of participants.

4. Expected Outcomes

4.1 Theoretical Contributions

The forthcoming research is expected to broaden existing theoretical frameworks on ICT in education by extending their application to Physical Education (PE) - a subject often regarded as less compatible with digital integration compared to cognitively oriented disciplines. While prior scholarship has emphasized ICT adoption in mathematics, science, and literacy (e.g., Basri *et al.*, 2018; Ogunjobi *et al.*, 2023), this study seeks to

reposition ICT as a critical enabler of emotional safety, motivation, and engagement within PE.

In doing so, the research will contribute to constructivist and socio-emotional learning theories, illustrating how ICT can actively support embodied and affective dimensions of education, particularly for students with psychosocial barriers. It is anticipated that the study will illuminate how digital tools can help alleviate challenges such as anxiety, fear of judgment, and low self-esteem, thereby strengthening theoretical understandings of equity, accessibility, and inclusion in school contexts.

Ultimately, the research aspires to advance academic discourse on digital pedagogy, positioning ICT not only as a technological supplement but also as a transformative agent capable of reshaping inclusive practices in PE and expanding the conceptual boundaries of inclusive education theory.

4.2 Contributions to the Methodological Dimension

Methodologically, this study introduces an interdisciplinary approach that combines mixed-methods design with intervention-based research, thereby generating both generalizable findings and context-specific insights. The sequential integration of quantitative and qualitative phases, followed by a co-designed intervention, provides a robust model for educational research that emphasizes iterative knowledge building and practitioner engagement.

In addition, the study offers methodological proof-of-concept for assessing affective and motivational constructs in PE. By employing both psychometric instruments and observational protocols, it demonstrates the feasibility of capturing students' emotional and social dimensions of learning - domains that are often overlooked in traditional educational research. These outcomes have the potential to guide future investigations into student well-being, engagement, and inclusion beyond strictly academic contexts.

4.3 Contributions to Practice for Educators and Policymakers

The findings of this study are intended to generate evidence-based recommendations for teachers, curriculum developers, and policymakers on integrating ICT tools to promote inclusion and student well-being in PE classes. Practical outputs will include a set of digital pedagogical strategies and tools adaptable to diverse primary school contexts, including environments with limited technological infrastructure.

For teacher education, both in-service and pre-service, the study will highlight the digital competencies required to design and deliver inclusive PE lessons. It will also inform the development of training modules emphasizing emotional sensitivity, differentiated instruction, and the flexible application of digital media in inclusive contexts.

Moreover, the intervention model developed and tested in this research can be scaled or adapted for use in other educational levels or subject areas. This is particularly relevant in the post-pandemic era, where hybrid and individualized models of education

are increasingly emphasized. By providing practical insights, the study seeks to support educators in cultivating inclusive, technology-enabled classroom cultures that address psychosocial diversity.

4.4 Contributions to Inclusion and Equity in Education

This study directly contributes to global educational priorities, particularly those articulated in the United Nations Sustainable Development Goal 4 (Quality Education), by emphasizing equitable participation in PE for students at risk of marginalization due to psychosocial challenges. Its findings highlight that inclusion should not rely on separating vulnerable students into specialized programs but rather on enhancing mainstream practices through the strategic use of ICT.

Inclusion, as framed in this research, extends beyond mere physical presence in the classroom. It involves fostering environments where students feel emotionally safe, are actively engaged, and can grow as individuals. By advancing this perspective, the study addresses dimensions of inclusion - such as emotional security and psychosocial development - that remain underexplored in both ICT and PE research.

Ultimately, the study underscores ICT's capacity to serve as a catalyst for equity, ensuring that PE becomes a truly inclusive domain that empowers all learners.

5. Discussion and Limitations

5.1 Discussion

This research is designed to propose an original model for integrating ICT into Physical Education (PE) lessons, both in classroom and outdoor sporting contexts, with the overarching aim of fostering the social inclusion of students experiencing psychosocial barriers. In doing so, it seeks to fill a critical gap in the literature situated at the intersection of inclusive pedagogy, digital technology, and physical activity in primary education. While prior studies have examined ICT in general classroom instruction, its potential to address emotional, behavioral, and social challenges within PE has remained comparatively underexplored (Li *et al.*, 2024).

The expected findings will contribute to a deeper understanding of the relationship between ICT integration and multiple dimensions of student development, including participation, engagement, and peer interaction. In parallel, the investigation of teachers' perceptions will help identify both enablers and barriers to the adoption of inclusive digital practices, offering critical insights into professional development needs and strategies for differentiated instruction (Li *et al.*, 2024; Wyant & Baek, 2018).

The discussion will also engage with specific technological interventions - such as augmented reality applications, interactive video games, and asynchronous movement-based platforms - that have the potential to address diverse psychological needs and support students facing issues such as low self-esteem, social withdrawal, or performance anxiety (Sheen *et al.*, 2018; Kiryakova, 2021). Beyond individual classroom practices, the study will highlight the broader systemic implications of ICT-driven

inclusion, particularly the necessity of digital literacy and adequate infrastructure to ensure that solutions are both effective and equitable (Li *et al.*, 2024; Nigam & C, 2022). By anticipating these contributions, the research positions itself to advance both theory and practice, while offering actionable pathways for policymakers, educators, and institutions seeking to leverage ICT as a tool for inclusive and transformative PE instruction.

5.2 Limitations

First, the regional focus of the sample - restricted to primary schools in selected areas - may affect the generalizability of the findings. While the research aims to capture a diverse range of contexts, the results may not fully reflect conditions in secondary education or in international settings (Kretschmann, 2015). Second, reliance on self-reported data from teachers, students, and parents may introduce bias due to factors such as social desirability, subjective perceptions, or limited understanding of ICT tools. Although classroom observations and field notes will be employed to enhance objectivity, the interpretive nature of qualitative data may still reduce reproducibility (Li *et al.*, 2024). Third, technical limitations may arise from inadequate access to ICT equipment or underdeveloped digital infrastructure in participating schools. Such constraints could affect both the implementation of the intervention and the accuracy of its evaluation, potentially limiting the robustness of the findings (Makhat *et al.*, 2021).

5.3 Delimitations

This study is deliberately focused on primary education, as this stage plays a foundational role in shaping children's social development and attitudes toward inclusion. By concentrating on students with psychosocial barriers - rather than those with intellectual or sensory disabilities - the research addresses a population that is often underrepresented in the literature on inclusive education (Botagariyev *et al.*, 2023).

The scope is further narrowed to PE, a subject uniquely positioned at the intersection of physical, social, and emotional development. To ensure both practical relevance and scalability, the study emphasizes low- to mid-cost technological solutions, including educational software, video platforms, gamified movement applications, and augmented reality systems (Li *et al.*, 2024).

Finally, while the research examines teacher perceptions, student engagement, and short-term psychosocial outcomes, it does not attempt to measure long-term academic achievement or extended developmental trajectories beyond the intervention period. Future studies may build on this work by incorporating longitudinal designs or exploring multimodal ICT interventions across broader educational contexts (Hamilton *et al.*, 2020).

6. Conclusion

The forthcoming research will investigate the potential of Information and Communication Technologies (ICT) as a transformative force in Physical Education (PE), with a specific focus on supporting the inclusion of primary school students facing psychosocial barriers. By adopting a mixed-methods design and incorporating an intervention-based approach, the study aims to address a critical gap at the nexus of digital pedagogy, inclusion, and embodied learning.

It is anticipated that the findings will demonstrate how ICT can foster participation, engagement, and social integration by enabling flexible, personalized, and emotionally supportive PE environments. Drawing on the perspectives of both teachers and students, the research intends to showcase the dual contributions of ICT: advancing theoretical understanding of inclusive digital pedagogy and providing practical strategies to reduce psychosocial barriers while repositioning PE as a discipline aligned with 21st-century inclusivity and adaptability.

At the same time, the research acknowledges the challenges and limitations of ICT integration, including infrastructural constraints, variability in teacher readiness, and contextual differences across schools. These challenges point to the necessity of systemic investment in digital infrastructure, targeted teacher professional development, and supportive policy frameworks that sustain inclusive, technology-enabled education.

Ultimately, this study aspires to contribute to educational theory, methodology, and practice by proposing a model in which ICT acts as a structural "bridge" between students, teachers, and learning environments. In doing so, it calls for a reframing of PE - not solely as a space for physical activity, but as a powerful arena for social inclusion, equity, and digital innovation.

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Conflict of Interest Statement

The authors declare no conflicts of interest.

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